

WHAT IS CLAIMED IS:

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1. A position information processing apparatus for processing position information comprising:

a designated position detector means for concurrently detecting a plurality of designated positions;

a designated position storage means for storing the plurality of designated positions detected by the designated position detector means; and

a travel path recognizer means for recognizing the travel paths of the plurality of designated positions based on the plurality of preceding designated positions stored in the designated position storage means and the plurality of current designated positions detected by the designated position detector means.

2. A position information processing apparatus according to claim 1, wherein the travel path recognizer means recognizes the travel paths of the plurality of designated positions by treating one of the plurality of preceding designated positions, closest to each of the plurality of current designated positions, as the preceding designated position of the current designated position.

3. A position information processing apparatus

according to claim 1, further comprising a designated-area detector means for detecting an area of a designated position, and

a designated-area storage means for storing an area detected by the designated-area detector means,

wherein the travel path recognizer means recognizes the travel paths of the plurality of designated positions by treating one of the plurality of preceding designated positions having an area, closest to the area of each of the plurality of current designated positions, as the preceding designated position of the current designated position.

4. A position information processing apparatus according to claim 1, wherein the designated position detector means is a touch-panel-type detector means.

5. A position information processing apparatus according to claim 1, wherein the designated position detector means comprises:

an image-pickup means for picking up a scene in which an operator designates a position; and

a designated-position recognizer means for recognizing the designated position from the image of the scene picked up by the image-pickup means.

6. A position information processing apparatus according to claim 1, wherein the designated position detector means detects the position of a finger tip of an operator.

7. An operation apparatus comprising:
a path detector means for detecting paths of a plurality of concurrently moving designated positions;
a designation interpreting means for interpreting a designation represented by a combination of the paths of the plurality of designated positions detected by the path detector means; and
an operation means for performing an operation based on the designation interpreted by the designation interpreting means.

8. An operation apparatus according to claim 7, wherein the designation interpreting means comprises:
a distance measuring means for measuring a distance between a plurality of designated positions;
a distance-change acquisition means for acquiring a change in the distance measured by the distance measuring means; and
a distance-change interpreting means for interpreting the designation based on the distance change acquired by the

distance-change acquisition means.

9. An operation apparatus according to claim 8, wherein the distance-change interpreting means interprets the designation as a contraction operation when the acquired distance change decreases.

10. An operation apparatus according to claim 8, wherein the distance-change interpreting means interprets the designation as an expansion operation when the acquired distance change increases.

11. An operation apparatus according to claim 8, wherein the distance-change acquisition means acquires an amount of change in the measured distance, and the distance-change interpreting means interprets the designation as a command for one of a contraction operation and an expansion operation at a magnification corresponding to the acquired amount of change.

12. An operation apparatus according to claim 7, wherein the designation interpreting means comprises:

an angle measuring means for measuring an angle made between a reference line and a line that connects the plurality of designated positions;

an angle-change acquisition means for acquiring a change in the angle measured by the angle measuring means; and

an angle-change interpreting means for interpreting the designation based on the angle change acquired by the angle-change acquisition means.

13. An operation apparatus according to claim 12, wherein the angle-change interpreting means interprets the designation as a command for a clockwise rotation operation when the acquired angle change is in a clockwise direction.

14. An operation apparatus according to claim 12, wherein the angle-change interpreting means interprets the designation as a command for a counterclockwise rotation operation when the acquired angle change is in a counterclockwise direction.

15. An operation apparatus according to claim 12, wherein the angle-change acquisition means acquires a change in the measured angle, and the angle-change interpreting means interprets the designation as a command for a rotation in an amount of rotation corresponding to the acquired amount of change.

16. An operation apparatus according to claim 7, wherein the designation interpreting means comprises:

a designated fixed position detector means for detecting a designed fixed position based on the paths of the plurality of designated positions; and

a designated fixed-position-based designation interpreting means for interpreting the designation based on the designated fixed position detected by the designated fixed-position detector means and the paths of the designated positions other than the designated fixed position.

17. An operation apparatus according to claim 16, wherein the designated fixed-position-based designation interpreting means comprises:

a travel-direction acquisition means for acquiring the direction of travel of the designated position other than the designated fixed position; and

a travel-direction interpreting means for interpreting the designation based on the direction of travel acquired by the travel-direction acquisition means.

18. An operation apparatus according to claim 17, wherein the travel-direction interpreting means interprets the designation as a command for one of a next-item

operation, a next-page, a next-screen operation, a last-line operation, a leftward screen shifting operation, an expansion operation in a lateral direction only, and a contraction operation in a lateral direction only, when the acquired direction of travel is leftward.

19. An operation apparatus according to claim 17, wherein the travel-direction interpreting means interprets the designation as a command for one of a next-item operation, a next-page operation, a next-screen operation, a last-line operation, an upward screen shifting operation, an expansion operation in a vertical direction only, and a contraction operation in a vertical direction only, when the acquired direction of travel is upward.

20. An operation apparatus according to claim 17, wherein the travel-direction interpreting means interprets the designation as a command for one of a preceding-item operation, a preceding-page operation, a preceding-screen operation, a first-line operation, a downward screen shifting operation, an expansion operation in a vertical direction only, and a contraction operation in a vertical direction only, when the acquired direction of travel is downward.

21. An operation apparatus according to claim 17, wherein the travel-direction interpreting means interprets the designation as a command for one of a preceding-item operation, a preceding-page operation, a preceding-screen operation, a first-line operation, a rightward screen shifting operation, an expansion operation in a lateral direction only, and a contraction operation in a lateral direction only, when the acquired direction of travel is rightward.

22. An operation apparatus according to claim 17, wherein the travel-direction acquisition means further acquires a distance of travel of the designated position, and interprets the designation as a command for an operation of an operational amount responsive to the acquired distance of travel.

23. An operation apparatus according to claim 16, wherein the designated fixed-position-based designation interpreting means comprises:

a fixed-to-fixed position distance measuring means for measuring the distance between the designated fixed position and the designated positions other than the designated fixed position; and

a distance-change acquisition means for acquiring a

change in the distance measured by the fixed-to-fixed-position distance measuring means; and

a distance-change interpreting means for interpreting the designation based on the distance change acquired by the distance-change acquisition means.

24. An operation apparatus according to claim 23, wherein the distance-change interpreting means interprets the designation as a command for one of a contraction operation about the designated fixed position and a screen shifting operation in the direction of travel when the distance change acquired by the fixed-to-fixed-position distance measuring means decreases.

25. An operation apparatus according to claim 23, wherein the distance-change interpreting means interprets the designation as a command for an expansion operation about the designated fixed position or a screen shifting operation in the direction of travel when the distance change acquired by the fixed-to-fixed-position distance measuring means increases.

26. An operation apparatus according to claim 23, wherein there are a plurality of designated positions other than the designated fixed positions, and wherein the

distance-change interpreting means interprets the designation based on the change in the distance between the designated fixed position and each of the plurality of designated positions.

27. An operation apparatus according to claim 23, wherein the distance-change acquisition means acquires the amount of change in the measured distance and wherein the distance-change interpreting means interprets the designation as a command for one of a contraction operation and an expansion operation, at a magnification responsive to the acquired amount of change.

28. An operation apparatus according to claim 16, wherein the designated fixed-position-based designation interpreting means comprises:

a moving-to-moving-position distance measuring means for measuring the distance between the designated positions other than the designated fixed position;

a moving-to-moving-position distance change acquisition means for acquiring a change in the distance measured by the moving-to-moving-position measuring means; and

a distance-change interpreting means for interpreting the designation based on the distance change acquired by the moving-to-moving-position change acquisition means.

29. An operation apparatus according to claim 28, wherein the distance-change interpreting means interprets the designation as a command for a contraction operation about the designated moving position when the acquired distance change decreases.

30. An operation apparatus according to claim 28, wherein the distance-change interpreting means interprets the designation as a command for an expansion operation about the designated moving position when the acquired distance change increases.

31. An operation apparatus according to claim 28, wherein the moving-to-moving-position distance change acquisition means acquires the amount of change in the distance between the designated positions, and wherein the distance-change interpreting means interprets the designation as a command for one of a contraction operation and a expansion operation, at a magnification responsive to the acquired amount of change.

32. An operation apparatus according to claim 28, wherein the distance-change interpreting means interprets the designation based on the change in each of the distances

between at least three designated positions.

33. An operation apparatus according to claim 16, wherein the designated fixed-position-based designation interpreting means comprises:

an angle measuring means for measuring an angle made between a reference line and a line that connects the designated fixed position and the designated position other than the designated fixed position;

an angle-change acquisition means for acquiring a change in the angle measured by the angle measuring means; and

an angle-change interpreting means for interpreting the designation based on the angle change acquired by the angle-change acquisition means.

34. An operation apparatus according to claim 33, wherein the angle-change interpreting means interprets the designation as a command for a clockwise rotation operation rotating about the designated fixed position or for a clockwise modification operation with the designated fixed position kept stationary when the acquired angle change is in a clockwise direction.

35. An operation apparatus according to claim 33,

wherein the angle-change interpreting means interprets the designation as a command for a counterclockwise rotation operation rotating about the designated fixed position or for a counterclockwise modification operation with the designated fixed position kept stationary when the acquired angle change is in a counterclockwise direction.

36. An operation apparatus according to claim 33, wherein the angle-change acquisition means acquires the amount of change in the measured angle, and wherein the angle-change interpreting means interprets the designation as a command for a rotation operation in a rotation direction about the designated fixed position in an amount of rotation responsive to the amount of change or for a modification operation in the rotation direction with the designated fixed position kept stationary.

37. An operation apparatus according to claim 16, wherein the designated fixed-position-based designation interpreting means comprises:

an angle measuring means for measuring an angle made between a reference line and a line that connects the designated positions other than the designated fixed position;

an angle-change acquisition means for acquiring a

change in the angle measured by the angle measuring means;
and

an angle-change interpreting means for interpreting the designation based on the angle change acquired by the angle-change acquisition means.

38. An operation apparatus according to claim 37, wherein the angle-change interpreting means interprets the designation as a command for a clockwise rotation operation rotating about the designated fixed position or for a clockwise modification operation about the center of gravity of a designated moving position with the designated moving position kept stationary when the acquired angle change is in a clockwise direction.

39. An operation apparatus according to claim 37, wherein the angle-change interpreting means interprets the designation as a command for a counterclockwise rotation operation rotating about the designated fixed position or for a counterclockwise modification operation about the center of gravity of designated moving positions with the designated moving position kept stationary when the acquired angle change is in a counterclockwise direction.

40. An operation apparatus according to claim 37,

wherein the angle-change acquisition means acquires the amount of change in the measured angle, and wherein the angle-change interpreting means interprets the designation as a command for a rotation operation in a rotation direction about the designated fixed position in an amount of rotation responsive to the amount of change or for a modification operation in the rotation direction about the center of gravity of designated moving positions with the designated fixed position kept stationary.

41. An operation apparatus according to claim 7, wherein the designation interpreting means comprises:

a positional-relationship determining means for determining a positional relationship between designated positions; and

a positional-relationship-based designation interpreting means for interpreting the designation based on the positional relationship detected by the positional relationship determined by the positional-relationship determining means.

42. An operation apparatus according to claim 41, wherein the positional-relationship-based designation interpreting means comprises a travel area acquisition means for acquiring the area of travel of the designated position,

and interprets the designation as a command for an operation within the acquired area of travel.

43. An operation apparatus according to claim 41, wherein the positional-relationship-based designation interpreting means interprets the designation as a command for a deleting operation or a cutting operation when the positional relationship determined by the positional-relationship determining means is in a vertical relationship.

44. An operation apparatus according to claim 41, wherein the positional-relationship-based designation interpreting means interprets the designation as a command for a copying operation when the positional relationship determined by the positional-relationship determining means is in a lateral relationship.

45. An operation apparatus according to claim 41, wherein the positional-relationship determining means comprises an angle measuring means for measuring the angle made between a reference line and a line that connects a plurality of designated positions, and determines the positional relationship based on the measured angle.

46. An operation apparatus according to claim 41,

wherein the positional-relationship determining means determines the positional relationship to be in a vertical relationship when the angle measured by the angle measuring means falls within a predetermined range with respect to a vertical direction.

47. An operation apparatus according to claim 41, wherein the positional-relationship determining means determines the positional relationship to be in a lateral relationship when the angle measured by the angle measuring means falls within a predetermined range with respect to a lateral direction.

48. An operation apparatus according to claim 41, wherein the positional-relationship-based designation interpreting means comprises:

a positional-relationship change determining means for determining a change in the determined positional relationship; and

a positional-relationship change interpreting means for interpreting the designation based on the positional-relationship change determined by the positional-relationship change determining means.

49. An operation apparatus according to claim 48,

wherein the positional-relationship change interpreting means interprets the designation as a command for one of an inversion operation, a deleting operation, and a cutting operation when the determined positional-relationship change indicates an inversion.

50. An operation apparatus according to claim 48, wherein the positional-relationship change interpreting means interprets the designation as a command for one of a lateral inversion operation, a deleting operation, and a cutting operation when the determined positional-relationship change indicates a lateral inversion.

51. An operation apparatus according to claim 48, wherein the positional-relationship change interpreting means interprets the designation as a command for one of a vertical inversion operation, a deleting operation, and a cutting operation when the determined positional-relationship change indicates a vertical inversion.

52. An operation apparatus according to claim 48, wherein the positional-relationship change interpreting means interprets the designation as a command for one of an expansion operation and a contraction operation when the determined positional-relationship change indicates no

change.

53. An operation apparatus according to claim 48, wherein the positional-relationship change determining means comprises:

an angle measuring means for measuring an angle made between a reference line and a line that connects a plurality of designated positions; and

an angle-change acquisition means for acquiring a change in the angle measured by the angle measuring means,

wherein the positional-relationship change determining means determines the positional-relationship change based on the angle change acquired by the angle-change acquisition means.

54. An operation apparatus according to claim 53, wherein the positional-relationship change determining means determines the positional-relationship change to be in an inversion when the angle change acquired by the angle-change acquisition means falls within a predetermined bilaterally symmetrical range.

55. An operation apparatus according to claim 53, wherein the positional-relationship change determining means determines the positional-relationship change to be no

change when the angle change acquired by the angle-change acquisition means falls outside a predetermined bilaterally symmetrical range.

56. An operation apparatus according to claim 48, wherein the positional-relationship change determining means comprises:

a lateral positional-relationship determining means for determining that a plurality of designated positions are horizontally aligned; and

a lateral positional-relationship change determining means for determining a change in the lateral positional relationship determined by the lateral positional-relationship determining means,

wherein the positional-relationship change determining means determines the positional relationship based on the change in the determined lateral positional relationship.

57. An operation apparatus according to claim 56, wherein the positional-relationship change determining means determines the positional-relationship change to be a lateral inversion when the change in the lateral positional relationship determined by the lateral positional-relationship determining means is a negative value.

58. An operation apparatus according to claim 56, wherein the positional-relationship change determining means determines the positional-relationship change to be no change when the change in the lateral positional relationship determined by the lateral positional-relationship determining means is a positive value.

59. An operation apparatus according to claim 48, wherein the positional-relationship change determining means comprises:

a vertical positional-relationship determining means for determining that a plurality of designated positions are vertically aligned; and

a vertical positional-relationship change determining means for determining a change in the lateral positional relationship determined by the vertical positional-relationship determining means,

wherein the positional-relationship change determining means determines the positional relationship based on the change in the lateral positional-relationship determined by the vertical positional-relationship change determining means.

60. An operation apparatus according to claim 59, wherein the positional-relationship change determining means

determines the positional-relationship change to be a vertical inversion when the change in the vertical positional relationship determined by the vertical positional-relationship determining means is a negative value.

61. An operation apparatus according to claim 59, wherein the positional-relationship change determining means determines the positional-relationship change to be no change when the change in the vertical positional relationship determined by the vertical positional-relationship determining means is a positive value.

62. An operation apparatus according to claim 41, wherein the positional-relationship determining means comprises:

a designated fixed-position detector means for detecting a designated fixed position based on the paths of the plurality of designated positions; and

a designated fixed-to-moving-position positional-relationship determining means for determining the positional relationship between the designated fixed position detected by the designated fixed-position detector means and the designated position other than the designated fixed position.

63. An operation apparatus according to claim 62, wherein the positional-relationship-based designation interpreting means comprises a travel-direction acquisition means for acquiring the direction of travel of the designated position other than the designated fixed position, and wherein the positional-relationship-based designation interpreting means interprets the designation based on the direction of travel acquired by the travel-direction acquisition means and the positional relationship with respect to the designated fixed position.

64. An operation apparatus according to claim 63, wherein the travel-direction acquisition means comprises a designated position travel distance acquisition means for acquiring the distance of travel of the designated position, and

wherein the positional-relationship-based designation interpreting means interprets the designation as a command for an operation having an operational amount responsive to the distance of travel acquired by the designated position travel distance acquisition means.

65. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the

designated position travel-direction acquisition means is leftward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the right of the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of a next-item operation, a next-page operation, a next-screen operation, a last-line operation, and a contraction operation in a lateral direction only.

66. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is leftward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the left of the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of a leftward screen shifting operation and an expansion operation in a lateral direction only.

67. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is leftward, and when the positional relationship determined by the

designated fixed-to-moving-position positional-relationship determining means is above the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for a counterclockwise rotation operation.

68. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is leftward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is below the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for a clockwise rotation operation.

69. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated position travel-direction acquisition means is upward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the right of the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for a counterclockwise rotation operation.

70. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is upward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the left of the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for a clockwise rotation operation.

71. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is upward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is above the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of an upward screen shifting operation and an expansion operation in a vertical direction only.

72. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is upward, and

when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is below the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of a next-item operation, a next-page operation, a next-screen operation, a last-line operation, and a contraction operation in a vertical direction only.

73. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated position travel-direction acquisition means is downward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the right of the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for a clockwise rotation operation.

74. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is downward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the left of the designated fixed

position, the positional-relationship-based designation interpreting means interprets the designation as a command for a counterclockwise rotation operation.

75. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is downward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is above the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of a preceding-item operation, a preceding-page operation, a preceding-screen operation, a first-line operation, and a contraction operation in a vertical direction only.

76. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is downward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is below the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of a downward screen shifting operation and an expansion

operation in a vertical direction only.

77. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated position travel-direction acquisition means is rightward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the right of the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of a rightward screen shifting operation and an expansion operation in a lateral direction only.

78. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is rightward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is to the left of the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for one of a preceding-item operation, a preceding-page operation, a preceding-screen operation, a first-line operation, and a contraction operation in a lateral direction only.

79. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is rightward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is above the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for a clockwise rotation operation.

80. An operation apparatus according to claim 63, wherein when the direction of travel acquired by the designated travel-direction acquisition means is rightward, and when the positional relationship determined by the designated fixed-to-moving-position positional-relationship determining means is below the designated fixed position, the positional-relationship-based designation interpreting means interprets the designation as a command for a counterclockwise rotation operation.

81. An operation apparatus according to claim 62, wherein the designated fixed-to-moving-position positional-relationship determining means comprises a designated moving-position angle acquisition means for acquiring an

angle between a reference line and a line that connects the designated positions prior to and subsequent to a travel, and wherein the designated fixed-to-moving-position positional-relationship determining means determines the positional relationship based on the angle acquired by the designated moving-position angle acquisition means.

82. An operation apparatus according to claim 81, wherein the positional-relationship determining means determines the position relationship to be above when the angle acquired by the designated moving-position angle acquisition means falls within a predetermined range with respect to an upward direction.

83. An operation apparatus according to claim 81, wherein the positional-relationship determining means determines the position relationship to be below when the angle acquired by the designated moving-position angle acquisition means falls within a predetermined range with respect to a downward direction.

84. An operation apparatus according to claim 81, wherein the positional-relationship determining means determines the position relationship to be leftward when the angle acquired by the designated moving-position angle

acquisition means falls within a predetermined range with respect to a leftward direction.

85. An operation apparatus according to claim 81, wherein the positional-relationship determining means determines the position relationship to be rightward when the angle acquired by the designated moving-position angle acquisition means falls within a predetermined range with respect to a rightward direction.

86. An operation apparatus according to claim 63, wherein the travel-direction acquisition means comprises a travel-angle acquisition means for acquiring an angle from the origin of a travel to the destination of the travel of the designated position, and wherein the travel-direction acquisition means acquires the direction of travel based on the angle acquired by the travel-angle acquisition means.

87. An operation apparatus according to claim 86, wherein the positional-relationship determining means determines the position relationship to be above when the angle acquired by the travel-angle acquisition means falls within a predetermined range with respect to an upward direction.

88. An operation apparatus according to claim 86, wherein the positional-relationship determining means determines the position relationship to be below when the angle acquired by the travel-angle acquisition means falls within a predetermined range with respect to a downward direction.

89. An operation apparatus according to claim 86, wherein the positional-relationship determining means determines the position relationship to be leftward when the angle acquired by the travel-angle acquisition means falls within a predetermined range with respect to a leftward direction.

90. An operation apparatus according to claim 86, wherein the positional-relationship determining means determines the position relationship to be rightward when the angle acquired by the travel-angle acquisition means falls within a predetermined range with respect to a rightward direction.

91. An operation apparatus according to claim 62, wherein the designated fixed-position detector means detects two designated fixed positions, the designated fixed-to-moving-position positional-relationship determining means

determines the positional relationship of a designated moving position with respect to the two detected designated fixed positions, and

the positional-relationship-based designation interpreting means interprets the designation based on the positional relationship of the designated moving position with respect to the two designated fixed positions.

92. An operation apparatus according to claim 91, wherein the designated fixed-to-moving-position positional-relationship determining means comprises:

a fixed-to-fixed-position angle acquisition means for acquiring an angle made between a reference line and a line that connects the two designated fixed positions;

a fixed-to-moving-position angle acquisition means for acquiring an angle made between the reference line and a line that connects one of the two designated fixed position and the designated moving position;

an angle-relationship determining means for determining an angle relationship between the angle acquired by the fixed-to-fixed-position angle acquisition means and the angle acquired by the fixed-to-moving-position angle acquisition means; and

an angle-relationship change determining means for determining a change in the angle relationship determined by

the angle-relationship determining means.

93. An operation apparatus according to claim 92, wherein the angle-relationship determining means determines the angle relationship to be in a clockwise rotation direction when the angle acquired by the fixed-to-moving-position angle acquisition means is smaller than the angle acquired by the fixed-to-fixed-position angle acquisition means.

94. An operation apparatus according to claim 92, wherein the angle-relationship determining means determines the angle relationship to be in a counterclockwise rotation direction when the angle acquired by the fixed-to-moving-position angle acquisition means is greater than the angle acquired by the fixed-to-fixed-position angle acquisition means.

95. An operation apparatus according to claim 92, wherein the angle-relationship change determining means determines the angle relationship change to be an inversion when the relationship determined by the angle-relationship determining means changes.

96. An operation apparatus according to claim 92,

wherein the positional-relationship-based designation interpreting means interprets the designation as a command for a inversion operation symmetrical with respect to a line connecting the designated fixed positions when the angle-relationship change determining means determines the angle-relationship change to be an inversion.

97. An operation apparatus according to claim 62, wherein the designated fixed-position detector means detects at least three designated fixed positions,

the designated fixed-to-moving-position positional-relationship determining means determines the positional relationship of a designated moving position with respect to at least the two detected designated fixed positions, and

the positional-relationship-based designation interpreting means interprets the designation based on the positional relationship of the designated moving position with respect to the three designated fixed positions.

98. An operation apparatus according to claim 97, wherein the designated fixed-to-moving-position positional-relationship determining means comprises:

a fixed-to-fixed-position angle acquisition means for acquiring an angle made between a reference line and a line that connects two of the three designated fixed positions;

a fixed-to-moving-position angle acquisition means for acquiring an angle made between the reference line and a line that connects one of the three designated fixed position and the designated moving position;

an angle-relationship determining means for determining an angle relationship between the angle acquired by the fixed-to-fixed-position angle acquisition means and the angle acquired by the fixed-to-moving-position angle acquisition means; and

an angle-relationship change determining means for determining a change in the angle relationship determined by the angle-relationship determining means.

99. An operation apparatus according to claim 98, wherein the angle-relationship determining means determines the angle relationship by comparing the maximum angle and the minimum angle acquired by the fixed-to-fixed-position angle acquisition means with the angle acquired by the fixed-to-moving-position angle acquisition means.

100. An operation apparatus according to claim 99, wherein the angle-relationship determining means compares the angle which is acquired by the fixed-to-moving-position angle acquisition means with respect to the designated fixed positions of the number which is smaller than the number of

the designated fixed positions by one.

101. An operation apparatus according to claim 100, wherein the angle-relationship determining means determines that the angle relationship falls within an area when the angle acquired by the fixed-to-moving-position angle acquisition means is between the maximum angle and the minimum angle acquired by the fixed-to-fixed-position angle acquisition means.

102. An operation apparatus according to claim 100, wherein the angle-relationship determining means determines that the angle relationship falls outside an area when the angle acquired by the fixed-to-moving-position angle acquisition means is not between the maximum angle and the minimum angle acquired by the fixed-to-fixed-position angle acquisition means.

103. An operation apparatus according to claim 98, wherein the angle-relationship change determining means interprets the angle relationship as an outward shifting out of an area when the relationship determined by the angle-relationship determining means moves outwardly from within the area.

104. An operation apparatus according to claim 98, wherein the angle-relationship change determining means interprets the angle relationship as an inward shifting into an area when the relationship determined by the angle-relationship determining means moves into the area.

105. An operation apparatus according to claim 97, wherein the positional-relationship-based designation interpreting means interprets the designation as a command for a deleting operation for deleting an area when a change determined by the designated fixed-to-moving-position positional-relationship determining means is an outward shifting out of the area.

106. An operation apparatus according to claim 97, wherein the positional-relationship-based designation interpreting means interprets the designation as a command for an operation for imparting an attribute to an area when a change determined by the designated fixed-to-moving-position positional-relationship determining means is an inward shifting into the area.

107. An operation apparatus according to claim 106, wherein the imparting of the attribute is a coloring operation.

108. An operation apparatus according to claim 7, wherein the designation interpreting means comprises

a stationary time measurement means for measuring a duration of time during which each designated position remains stationary, and

wherein the designation interpreting means interprets the designation as a command for designating an area enclosed by the plurality of designated positions when the stationary time of the plurality of designated positions, measured by the stationary time measurement means, is not shorter than a constant duration of time.

109. An operation apparatus according to claim 108, wherein the designation interpreting means interprets the travel of the designated position after the elapse of the constant time as a command for an operation to the area designated by the designated position.

110. An operation apparatus according to claim 108, wherein the designation interpreting means comprises an area indicator means for indicating the interpreted designated area in a manner that clearly distinguishes the interpreted designated area from the remaining area.

111. An operation apparatus according to claim 7, wherein the designation interpreting means comprises:

a designated position count detector means for detecting a count of the designated positions;

a count-change detector means for detecting a change in the count of the designated positions detected by the designated position count detector means; and

a count-change interpreting means for interpreting the designation based on the change in the count of the designated positions detected by the count-change detector means.

112. An operation apparatus according to claim 111, wherein the count-change interpreting means interprets the designation based on a change from an initial designated position count detected by the count-change detector means.

113. An operation apparatus according to claim 111, wherein the count-change interpreting means interprets the designation as an intermediate state in the middle of designating an object to be handled when the detection result provided by the count-change detector means indicates an increase from the initial designated position count.

114. An operation apparatus according to claim 111,

comprising an initially designated position detector means for detecting an initially designated position, wherein the count-change interpreting means interprets the designation as a command for an operation with respect to the designated position detected by the initially designated position detector means when the result detected by the count-change detector means indicates an increases from the initial number of the designated positions.

115. An operation apparatus according to claim 114, wherein the count-change interpreting means interprets the designation as a command for one of a rotation operation, an expansion operation and a contraction operation about the designated position detected by the initially designated position detector means when the initial number of the designated positions detected by the designated position count detector means is one.

116. An operation apparatus according to claim 111, wherein the count-change interpreting means interprets the designation based on the change in the last designated position count detected by the designated position count-change detector means.

117. An operation apparatus according to claim 116,

wherein the count-change interpreting means interprets the designation as a command for one of a cancel operation to cancel steps taken until then and a copying operation of an object when the change in the last designated position count detected by the count-change detector means is a decrease.

118. An operation apparatus according to claim 116, wherein the count-change interpreting means interprets the designation as a command for one of a confirming operation to confirm steps taken until then, a cutting operation and a deleting operation of an object when the change in the last designated position count detected by the count-change detector means indicates no change.

119. An operation apparatus according to claim 7, comprising a designated information acquisition means for acquiring designated information other than the designated position and the designated path, wherein the designation interpreting means comprises a designated information interpreting means for interpreting the designation based on the designated information acquired by the designated information acquisition means.

120. An operation apparatus according to claim 119, wherein the designated information interpreting means

interprets the designation as a command for an operation for increasing an operational amount when the designated information acquired by the designated information acquisition means becomes large in size.

121. An operation apparatus according to claim 119, wherein the designated information interpreting means interprets the designation as a command for an operation for repeating an operational step as the designated information acquired by the designated information acquisition means exceeds a constant value.

122. An operation apparatus according to claim 119, wherein the designated information interpreting means interprets the designation as a command for narrowing repetition intervals of an operation as the designated information acquired by the designated information acquisition means becomes large in size.

123. An operation apparatus according to claim 119, wherein the designated information interpreting means interprets the designation as a command for suspending an operation that is being repeated.

124. An operation apparatus according to claim 119,

wherein the designated information interpreting means interprets the designation as a command for maximizing an operational amount when the designated information acquired by the designated information acquisition means exceeds a constant value.

125. An operation apparatus according to claim 119, wherein the designated information acquisition means acquires a total count of the designated positions as the designated information.

126. An operation apparatus according to claim 125, wherein the designated information interpreting means interprets the designation as a command for increasing an operational amount as the total count of the acquired designated positions increases.

127. An operation apparatus according to claim 126, wherein the command for increasing the operational amount is applied to one of a number of items in one of a preceding-item operation and a next-item operation, a number of pages in one of a preceding-page operation and a next-page operation, a number of screens in one of a preceding-screen operation and a next-screen operation, and an expansion operation and a contraction operation.

128. An operation apparatus according to claim 125, wherein the designated information interpreting means interprets the designation as a command for repeating a predetermined operation when the total count of acquired designated positions exceeds a constant value.

129. An operation apparatus according to claim 128, wherein the predetermined operation is applied to one of a number of items in one of a preceding-item operation and a next-item operation, a number of pages in one of a preceding-page operation and a next-page operation, a number of screens in one of a preceding-screen operation and a next-screen operation, and an expansion operation and a contraction operation.

130. An operation apparatus according to claim 125, wherein the designated information interpreting means interprets the designation as a command for maximizing an operational amount when the total count of acquired designated positions exceeds a constant value.

131. An operation apparatus according to claim 130, wherein the command for maximizing the operational amount is applied to one of a shifting operation to the first item and

a shifting operation to the last item, a shifting operation to the first page and a shifting operation to the last page, a shifting operation to the first screen and a shifting operation to the last screen, and an expansion operation to a maximum and a contraction operation to a minimum.

132. An operation apparatus according to claim 119, wherein the designated information acquisition means acquires a travel speed of the designated position as the designated information.

133. An operation apparatus according to claim 132, wherein the designated information interpreting means interprets the designation as a command for increasing an operational amount as the travel speed increases.

134. An operation apparatus according to claim 133, wherein the operational amount is one of a number of items in one of a preceding-item operation and a next-item operation, a number of pages in one of a preceding-page operation and a next-page operation, a number of screens in one of a preceding-screen operation and a next-screen operation, and an expansion operation and a contraction operation.

135. An operation apparatus according to claim 132, wherein the designated information interpreting means interprets the designation when a command for repeating a predetermined operation when the total count of acquired designated positions exceeds a constant value.

136. An operation apparatus according to claim 135, wherein the predetermined operation is one of a preceding-item operation, a next-item operation, a preceding-page operation, a next-page operation, a preceding-screen operation, a next-screen operation, an expansion operation, and a contraction operation.

137. An operation apparatus according to claim 132, wherein the designated information interpreting means interprets the designation when a command for maximizing an operational amount as the travel speed exceeds a constant value.

138. An operation apparatus according to claim 137, wherein the command for maximizing the operational amount is applied to one of a shifting operation to the first item and a shifting operation to the last item, a shifting operation to the first page and a shifting operation to the last page, a shifting operation to the first screen, a shifting

operation to the last screen, an expansion operation to a maximum, and a contraction operation to a minimum.

139. An operation apparatus according to claim 119, wherein the designated information acquisition means acquires a contact pressure of the designated position as the designated information other than the designated position.

140. An operation apparatus according to claim 139, wherein the designated information interpreting means interprets the designation as a command for increasing an operational amount as the contact pressure intensifies.

141. An operation apparatus according to claim 140, wherein the operational amount is one of a number of items in one of a preceding-item operation and a next-item operation, a number of pages in one of a preceding-page operation and a next-page operation, a number of screens in one of a preceding-screen operation and a next-screen operation, and an expansion operation and a contraction operation.

142. An operation apparatus according to claim 139, wherein the designated information interpreting means

interprets the designation as a command for repeating a predetermined operation when the contact pressure exceeds a constant value.

143. An operation apparatus according to claim 142, wherein the predetermined operation is one of a preceding-item operation, a next-item operation, a preceding-page operation, a next-page operation, a preceding-screen operation, a next-screen operation, an expansion operation, and a contraction operation.

144. An operation apparatus according to claim 139, wherein the designated information interpreting means interprets the designation as a command for maximizing an operational amount when the contact pressure exceeds a constant value.

145. An operation apparatus according to claim 144, wherein the command for maximizing the operational amount is applied to one of a shifting operation to the first item and a shifting operation to the last item, a shifting operation to the first page and a shifting operation to the last page, a shifting operation to the first screen and a shifting operation to the last screen, and an expansion operation to a maximum and a contraction operation to a minimum.

146. An operation apparatus according to claim 119, wherein the designated information acquisition means acquires a distance of travel of the designated position as the designated information other than the designated position.

147. An operation apparatus according to claim 146, wherein the designated information interpreting means interprets the designation as a command for increasing an operational amount as the travel distance becomes long.

148. An operation apparatus according to claim 147, wherein the operational amount is one of a number of items in one of a preceding-item operation and a next-item operation, a number of pages in one of a preceding-page operation and a next-page operation, a number of screens in one of a preceding-screen operation and a next-screen operation, and an expansion operation and a contraction operation.

149. An operation apparatus according to claim 147, wherein the designated information interpreting means interprets the designation as a command for repeating a predetermined operation when the travel distance becomes

longer than a constant value.

150. An operation apparatus according to claim 149, wherein the predetermined operation is one of a preceding-item operation, a next-item operation, a preceding-page operation, a next-page operation, a preceding-screen operation, a next-screen operation, an expansion operation, and a contraction operation.

151. An operation apparatus according to claim 147, wherein the designated information interpreting means interprets the designation as a command for maximizing an operational amount when the travel distance becomes longer than a constant value.

152. An operation apparatus according to claim 151, wherein the command for maximizing the operational amount is applied to one of a shifting operation to the first item and a shifting operation to the last item, a shifting operation to the first page and a shifting operation to the last page, a shifting operation to the first screen and a shifting operation to the last screen, and an expansion operation to a maximum and a contraction operation to a minimum.

153. A position information processing method for

processing position information, comprising:

a first detecting step of concurrently detecting a plurality of designated positions;

a second detecting step of concurrently detecting a plurality of designated positions, subsequent to the first detection step; and

a travel path recognition step of recognizing the travel paths of the plurality of the designated positions based on the plurality of preceding designated positions detected in the first detecting step and the plurality of current designated positions detected in the second detecting step.

154. An operational method comprising:

a path detecting step of detecting paths of a plurality of concurrently moving designated positions;

a designation interpreting step of interpreting a designation represented by a combination of the paths of the plurality of designated positions detected in the path detecting step; and

an operation step of performing an operation based on the designation interpreted in the designation interpreting step.

155. A computer-readable storage medium storing a

position information processing program for controlling a computer to perform processing of position information, the program comprising codes for causing the computer to perform:

a first acquisition step of concurrently acquiring a plurality of designated positions that have been concurrently detected;

a second acquisition step of concurrently acquiring a plurality of designated positions, subsequent to the acquisition of the designated positions in the first acquisition step; and

a travel path recognition step of recognizing the travel paths of the plurality of the designated positions based on the plurality of preceding designated positions acquired in the first acquisition step and the plurality of current designated positions acquired in the second acquiring step.

156. A computer-readable storage medium storing a manipulation program for controlling to perform manipulation, the program comprising codes for causing the computer to perform:

a path detecting step of detecting paths of a plurality of concurrently moving designated positions;

a designation interpreting step of interpreting a

designation represented by a combination of the paths of the plurality of designated positions detected in the path detecting step; and

an operation step of performing an operation based on the designation interpreted in the designation interpreting step.

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